

Take Test: Quiz 5. Support vector machines for regression and novelty detection

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Test Information

Description

Instructions

Multiple Attempts This test allows multiple attempts.

Force Completion This test can be saved and resumed later.

Your answers are saved automatically.

QUESTION 1

0.01 points

✔ Saved

Regression can be defined as the estimation of one or more discrete variables from a set of observations.

- ☐ True
- ☒ False

QUESTION 2

0.01 points

✔ Saved

In order to perform regression, we always need to hide the bias in the weight vector w.

- ☐ True
- ☒ False

QUESTION 3

0.01 points

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- The MMSE criterion
- ☐ Is intended to minimize the expectation of the error, but since the distribution of the observed data is unknown, we need to approximate it by the minimization of a sample average of the quadratic error.
- ☐ Is an optimization criterion that always has a solution and it is unique.
- ☐ It is an optimization criterion that can be achieved by several algorithms in block or iteratively.
- ☒ All of them are true.

QUESTION 4

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- The Least Mean Squares algorithm
- ☐ Is an approximation of the MMSE.
- ☐ Is an algorithm that approximates an optimal criterion by gradient descent.
- ☐ Is an algorithm that approximates the square error gradient by the product of the error times the observation.
- ☒ All of the above is right.

QUESTION 5

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- Support vector regression
- ☐ considers separately positive and negative errors in order to reduce the solution bias.
- ☐ uses positive slack variables because only the positive errors are taken into account.
- ☒ uses positive slack variables that represent the absolute value of the error minus a small quantity which is taken as an error tolerance.
- ☒ is an optimization criterion that minimizes a structural term represented by the norm of the weights plus an empirical term that is a linear function of the error.

QUESTION 6

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- The dual variables of the support vectors can be expressed as $\alpha_n - \alpha_n^*$
- ☒ where α_n is positive if the error is positive and higher than ϵ , in which case $\alpha_n^* = 0$, and α_n^* is positive if the error is negative and lower than $-\epsilon$, in which case $\alpha_n = 0$.
- ☐ If the sample is outside the margin, the corresponding dual variable is less than C, and if the sample is inside the margin, the dual variable is zero.
- ☒ If the sample has an error which is less than the tolerance, both Lagrange multipliers are zero.
- ☐ If the sample is on the margin, the corresponding dual variable is equal to C, and if the sample is inside the margin, the dual variable is zero.

QUESTION 7

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- The nu-SVR is a type of SVM that eliminates parameter ϵ in order to reduce the number of free parameters.
- ☐ True
- ☒ False

QUESTION 8

0.01 points

✔ Saved

- The nu-SVM changes ϵ by ν , which is a parameter that has a different interpretation and it does not need to be validated.
- ☐ True
- ☒ False

QUESTION 9

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- Parameter ν in SVM is bounded between 0 and 1 and it has the following interpretation:
- ☐ It is bounded by the number of support vectors.
- ☒ It is an upper bound of the fraction of support vectors outside the ϵ band.
- ☐ It is a lower bound of the fraction of saturated support vectors.
- ☐ It is an upper bound of the fraction of support vectors.

QUESTION 10

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- The value of ϵ in a ν -SVR
- ☒ Decreases when ν increases, in order to increase the number of Support Vectors.
- ☐ Increases when ν increases in order to increase the number of support vectors
- ☐ Tends to zero when ν tends to 0.